

pumping the backwash fluid through the U-tube inlet port and outflowing the backwash fluid through the outlet ports of each compartment.

REMARKS

The above amendments and these remarks are responsive to the Office Action mailed on May 8, 2002. Claims 6 and 8 have been amended for clarity. Claims 6-11 are now pending in this application. Reconsideration on the basis of the above amendments and remarks below is kindly requested.

Firstly, applicant wishes to thank the Examiner for the telephonic interview with applicant's undersigned attorney on July 5, 2002.

The Examiner objected to the proposed amendment to the drawings as depicted in Figure 10 in that it introduces new matter. Applicant respectfully disagrees. Support for Figure 10 is found in the specification, page 6, lines 30-33 as filed as well as in the Figure incorporated in the specification on page 7 between lines 10-20. In fact, Figure 10 has been added to replace the Figure incorporated on page 7 of the specification. Thus, applicant submits all the matter shown in Figure 10 was disclosed in the application as originally filed. No new matter has been added. Consequently, applicant submits that the objection to the drawings should be withdrawn and that claim 10 should be approved.

The Examiner rejected claims 6-11 under 35 USC §112, second paragraph as being indefinite for failing to particularly point out in distinctive claims the subject matter which applicant regards as the invention. Specifically, the Examiner rejected the claims in that the claims recited the presence of an "adsorbent resin" whereas the preamble recited "an ion exchange" process. Claims 6 and 8 have been amended to now require an "ion exchange resin instead of an "adsorbent resin." The Examiner also rejected claim 8 for using the term "utilizing". Claim 8 has been amended by replacing the term "utilizing" with "performed by". As such, applicant submits that the rejections to claims 6-8 under 35 USC §112, second paragraph have been overcome.

The Examiner rejected claim 6 under 35 USC §102(b) as being anticipated by Seibel, U.S. Patent No. 4,719,010. Claim 6 is directed to an apparatus for conducting liquid separation comprising a liquid separation column divided into first and second vertical compartments, each

compartment including an upper fluid inlet port in the top of the compartment wherein the inlet ports are in full communication with the interior of the compartments and an external fluid source. The claim also requires that each compartment is equipped with an upper bed disposed inside the compartment below the inlet ports and that the upper beds have fluid distribution nozzles wherein fluid received from the inlet ports is directed into the compartments at a controlled flow rate. Furthermore, claim 6 requires that each compartment includes an outlet port for backwashing, disposed adjacent to and below each upper bed wherein the outlet ports remove particular matter larger than the upper bed nozzle openings. The claims also require that a U-tube portion of the liquid separation column between the compartments includes a lower fluid inlet port which is in communication with both the first and second vertical compartments and an ion exchange resin disposed within each vertical compartment. Seibel discloses an apparatus for rinsing a fixed bed ion exchanger using two liquid separation columns, each of which appears to be divided into two vertical compartments. The Seibel apparatus has a lower fluid inlet port located at the lower end of the column not an upper inlet fluid ports as required by claim 6. Furthermore, the bed disclosed in each of the vertical compartments do not appear to have fluid distribution nozzles as required by claim 6. In addition, Seibel does not appear to teach that the outlet ports remove particle matter larger than the bed nozzle openings as required by claim 6. Thus, applicant submits that claim 6 is not anticipated by Seibel.

The Examiner rejected claim 7 under 35 USC §103(a) as being unpatentable over Seibel in view of West. Claim 7 is dependent from claim 6. West discloses a water softener. However, the water softener of West does not incorporate a liquid separation column which is divided into a first and second vertical compartments and which has the features required by claim 6. As such, the combination of Seibel and West cannot render claim 7 obvious.

The Examiner rejected claim 6 under 35 USC §103(a) as being unpatentable over Astrom, U.S. Patent No. 1,688,915 in view Roberts, U.S. Patent No. 2,855,364. According to the Examiner, Astrom discloses the claimed invention with the exception of the recited outlet port below each individual bed. Roberts, according to the Examiner, discloses a similar ion exchange system, and discloses means for backwashing the ion exchange material contained therein in the recited manner. Consequently, the Examiner concluded that it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the system of Astrom with a backwashing means of Roberts in order to obtain the advantages disclosed by the secondary

reference. Applicant respectfully disagrees. Astrom discloses an apparatus for treating liquid and specifically teaches on column 2, lines 28-42 a way of washing the apparatus. Roberts discloses an upflow regeneration system. The Roberts system does not include a liquid separation column divided into a first and second vertical compartments. Roberts does not disclose, teach or suggest that his backwashing system can be incorporated in a liquid separation column comprising two vertical compartments. In fact, one skilled in the art reading both Astrom and Roberts would be dissuaded from using the backwashing system of Roberts with Astrom since Astrom already teaches a specific way of washing his system without requiring an outlet port for backwashing. Thus, there would be no need to incorporate the alleged backwashing system and alleged outlet port of Roberts into the system of Astrom. Thus, applicant submits that claim 6 does not render obvious by Astrom in view of Roberts.

Furthermore, claim 6 requires that the outlet ports remove particular matter larger than the upper bit nozzle openings. Neither Astrom nor Roberts disclose, teach or suggest the use of outlet ports that allow the removal of particular matter that is larger than the upper bed nozzle openings as required by claim 6. As such, applicant submits that claim 6 is not rendered obvious by Astrom in view of Roberts for this additional reason.

The Examiner rejected claims 8-11 under 35 USC §103(a) as being unpatentable over Astrom and Roberts as applied to claim 6 and further in view of Wiltrot, U.S. Patent No. 3,774,625. Claims 8-11 are dependent from claim 6. Wiltrot discloses a car wash water reclaim system. Wiltrot does not disclose a system and method of using an apparatus which includes a liquid separation column which is divided into a first and second vertical compartments and which includes the features required by claim 6. Thus, Wiltrot does not add anything to the teachings of Astrom and Roberts that would render claims 8-11 obvious. As such, applicant submits that claims 8-11 are not rendered obvious Astrom, Roberts and Wiltrot.

The rejections and objections to all claims pending in this application are believed to have been overcome and this application is now believed to be in condition for allowance. Should the Examiner have any remaining questions or concerns about the allowability of this application, the Examiner is kindly requested to call the undersigned attorney to discuss them.

Application No. 09/582,175

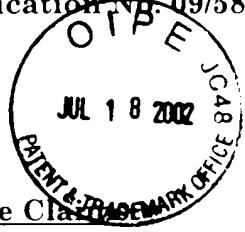
Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "Version with markings to show changes made."

Respectfully submitted,
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VERSION TO SHOW CHANGES MADE

In the Class

Amend claims 6 and 8 as follows:

6. (Twice Amended) An apparatus for conducting liquid separation utilizing an ion exchange process, the apparatus comprising:

a liquid separation column, the column being divided into first and second vertical compartments, the vertical compartments being joined at their lower ends to form a U-tube portion between the compartments, wherein the first and second compartments are in fluid communication;

each vertical compartment including an upper fluid inlet port located in the top of the compartment, the inlet ports being in fluid communication with the interior of the compartments and an external fluid source;

each vertical compartment being equipped with an upper bed disposed inside each compartment, the beds being proximate to the upper end of the compartments and below the inlet ports;

the upper beds having fluid distribution nozzles, wherein fluid received from the inlet ports is directed into the compartments at a controlled flow rate;

each compartment further including an outlet port for backwashing, each outlet port being disposed adjacent to and below each upper bed, wherein the outlet ports remove particulate matter larger than the upper bed nozzle openings;

the U-tube portion between the compartments including a lower fluid inlet port, wherein the lower fluid inlet port is in fluid communication with both the first and second vertical compartments; and;

an [adsorbant] ion exchange resin layer disposed within each vertical compartment, wherein a free board is defined between a top level of the [adsorbant] ion exchange resin layer and the upper bed in each compartment, whereby the free board allows the resin layer to expand and contract during the liquid separation process.

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8. (Amended) A liquid separation process [utilizing] performed by the apparatus of claim 6, wherein the inlet and outlet ports are in fluid communication with a service fluid supply, a regenerant fluid supply, a backwash fluid supply, and a pump for pumping the service fluid, regenerant fluid, and backwash fluid through the apparatus; the process comprising the steps of:

pumping service fluid through the inlet port of the first compartment down through the [adsorbant] ion exchange resin layer of the first compartment and up through the [adsorbant] ion exchange layer of the second compartment, the filtered fluid exiting the apparatus through the inlet port of the second compartment;

regenerating the [adsorbant] ion exchange resin layers by pumping regenerating fluid though the inlet port of the second compartment down through the [adsorbant] ion exchange resin layer of the second compartment and up through the [adsorbant] ion exchange layer of the first compartment, wherein the regenerant fluid exits the apparatus through the inlet port of the first compartment; and

backwashing the apparatus when the pressure drop of the service fluid increases to a predetermined level.